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10/588,755	08/08/2006	Ilan Ben-David	P-6519-US	2787

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EXAMINER	
SPAR, ILANA L	

ART UNIT	PAPER NUMBER
2629	

NOTIFICATION DATE	DELIVERY MODE
11/15/2010	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

USPTO@pczlaw.com
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Office Action Summary	Application No.	Applicant(s)	
	10/588,755	BEN-DAVID ET AL.	
	Examiner	Art Unit	
	ILANA SPAR	2629	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 October 2010*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,6,7,9-18,22,23,25-30,32,36 and 38-40* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,6,7,9-18,22,23,25-30,32,36 and 38-40* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *10/21/2010*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. The following Office Action is responsive to the amendments and remarks received on October 21, 2010.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1, 10, 11, 13-18, 26-30, 32, 36, and 38-40 are rejected under 35 U.S.C. 102(e) as being anticipated by Lee (US Patent No. 7,365,722).

With reference to claim 1, Lee teaches a color display device for displaying a more-than-three color image, the device comprising a driver control module to controllably activate one or more drivers of an array of sub-pixel elements of at least four different colors based on image data representing pixels of said color image in terms of at least three data components wherein said driver control module comprises:

a conversion module (610) for converting said image data into converted sub-pixel data representing said color image in terms of four or more primary colors (see column 10, lines 23-25) said conversion module comprises:

a first converter (601) for converting said image data into intermediate sub-pixel data of four or more primary colors (see column 10, lines 32-38 and column 11, lines 39-42), and

a second converter (602) for converting based on a position of each said sub-pixel element independently said intermediate sub-pixel data into said converted sub-pixel data using at least one conversion matrix, wherein data for each of said four or more primary colors of said converted sub-pixel data is in gray-level format (see column 10, lines 32-38, lines 59-65, column 11, lines 42-43, and column 12, line 3 to column 13, line 26), and

a controller (600) to control said conversion module to convert said image data into said converted sub-pixel data based on said one more display-attributes and said one or more image-attributes, wherein said controller is able to determine one or more values of said at least one conversion matrix based on at least one display attribute related to said display device and at least one image attribute related to said color image, and to provide said values of said at least one conversion matrix to said second converter (see column 10, lines 23-45 and column 12, lines 3-50).

With reference to claim 10, Lee teaches all that is required with reference to claim 1, and further teaches that said driver control module comprises a sub-pixel processor (500) to process said converted sub-pixel data, wherein said controller is able to control said processor to generate a sub-pixel signal based on at least one of said image attributes and said display attributes (see column 10, lines 59-65).

With reference to claim 11, Lee teaches all that is required with reference to claim 10, and further teaches an interface module (600) to generate said driver signals based on said sub-pixel data signal (see column 10, lines 38-45).

With reference to claim 13, Lee teaches all that is required with reference to claim 1, and further teaches that said one or more display-attributes comprise at least one attribute selected from the group consisting of a configuration of one or more defective sub-pixel elements within said array, a brightness non-homogeneity of said display device, and a color non-homogeneity of said display device (see column 6, lines 19-23 - the pixel sequence and four-color display data correct for a brightness non-homogeneity of the display device).

With reference to claim 14, Lee teaches all that is required with reference to claim 1, and further teaches that said one or more image-attributes comprise one or more attributes selected from the group consisting of a perceived bit-depth of pixels of at least part of said image, a viewed smoothness of at least part of said image, a brightness uniformity of at least part of said image, a color uniformity of at least part of said image, and a rendering scheme to be applied to at least part of said image (see column 6, lines 19-23 - the pixel sequence and four-color display data correct for a brightness non-uniformity of at least part of the image).

With reference to claim 15, Lee teaches all that is required with reference to claim 1, and further teaches a display panel containing said driver control module and said array of sub-pixel elements (see column 5, lines 5-10).

With reference to claim 16, Lee teaches all that is required with reference to claim 1, and further teaches that said array of sub-pixel elements comprises an array of liquid crystal elements (see column 5, line 5).

With reference to claim 17, Lee teaches a method of displaying a more-than-three color image comprising controllably activating one or more drivers of an array of sub-pixel elements of at least four different colors, based on image data representing pixels of said color image in terms of at least three data components, said one or more drivers to perform:

determining values of at least one conversion matrix based on at least one display attribute related to said display device and at least one image attribute related to said color image (see column 12, line 3 to column 13, line 26);

converting said image data into intermediate sub-pixel data of four or more primary colors (see column 10, lines 32-38 and column 11, lines 39-42); and

using said determined values of at least one conversion matrix to convert based on a position of each said sub-pixel element independently said intermediate sub-pixel data into converted sub-pixel data, said converted sub-pixel data representing said color image in terms of four or more primary colors, wherein data for each of said four or more primary colors of said converted sub-pixel data is in gray-level format (see column 10, lines 32-38, lines 59-65, column 11, lines 42-43, and column 12, line 3 to column 13, line 26).

With reference to claim 18, Lee teaches all that is required with reference to claim 17, and further teaches generating one or more driver signals for activating said

drivers based on one or more display attributes related to said display device and one or more image attributes related to said color image (see column 10, lines 38-45).

With reference to claim 26, Lee teaches all that is required with reference to claim 17, and further teaches processing said converted sub-pixel data and generating a sub-pixel signal based on at least one of said image attributes and said display attributes (see column 10, lines 59-65).

With reference to claim 27, Lee teaches all that is required with reference to claim 26, and further teaches generating said driver signals based on said sub-pixel data signal (see column 10, lines 38-45 and lines 59-65).

With reference to claim 28, Lee teaches all that is required with reference to claim 18, and further teaches that said one or more display-attributes comprise at least one attribute selected from the group consisting of a configuration of one or more defective sub-pixel elements within said array, a brightness non-homogeneity of said display device, and a color non-homogeneity of said display device (see column 6, lines 19-23 - the pixel sequence and four-color display data correct for a brightness non-homogeneity of the display device).

With reference to claim 29, Lee teaches all that is required with reference to claim 18, and further teaches that said one or more image-attributes comprise one or more attributes selected from the group consisting of a perceived bit-depth of pixels of at least part of said image, a viewed smoothness of at least part of said image, a brightness uniformity of at least part of said image, a color uniformity of at least part of said image, and a rendering scheme to be applied to at least part of said image (see

column 6, lines 19-23 - the pixel sequence and four-color display data correct for a brightness non-uniformity of at least part of the image).

With reference to claim 30, Lee teaches a color display system for displaying a more-than-three color image, the system comprising:

an input interface (600) to generate image data signals representing pixels of said color image in terms of at least three data components (see column 10, lines 23-45); and

a driver control module (600) to controllably activate one or more drivers of an array of sub-pixel elements of at least four different colors, based on said image data signals, wherein said driver control module is able to generate one or more driver signals for activating said drivers based on one or more display attributes related to said display device and one or more image attributes related to said color image (see column 10, lines 23-45 and column 12, line 3 to column 13, line 26).

With reference to claim 32, Lee teaches all that is required with reference to claim 31, and further teaches that said driver control module comprises:

a conversion module (610) to convert said image data signals into converted sub-pixel data signals representing said color image in terms of four or more colors (see column 10, lines 32-38 and column 11, lines 39-43); and

a controller (600) to control said conversion module to convert said image data signals based on said one or more display-attributes and said one or more image-attributes, wherein data for each of said four or more primary colors of said converted sub-pixel data is in gray-level format (see column 10, lines 23-45 and lines 59-65).

With reference to claim 36, Lee teaches all that is required with reference to claim 32, and further teaches that said driver control module comprises a sub-pixel processor to process said converted sub-pixel data signals, wherein said controller is able to control said processor to generate a sub-pixel signal based on at least one of said image attributes and said display attributes (see column 10, lines 59-65).

With reference to claim 38, Lee teaches all that is required with reference to claim 30, and further teaches that said one or more display-attributes comprise at least one attribute selected from the group consisting of a configuration of one or more defective sub-pixel elements within said array, a brightness non-homogeneity of said display device, and a color non-homogeneity of said display device (see column 6, lines 19-23 - the pixel sequence and four-color display data correct for a brightness non-homogeneity of the display device).

With reference to claim 39, Lee teaches all that is required with reference to claim 30, and further teaches that said one or more image-attributes comprise one or more attributes selected from the group consisting of a perceived bit-depth of pixels of at least part of said image, a viewed smoothness of at least part of said image, a brightness uniformity of at least part of said image, a color uniformity of at least part of said image, and a rendering scheme to be applied to at least part of said image (see column 6, lines 19-23 - the pixel sequence and four-color display data correct for a brightness non-uniformity of at least part of the image).

With reference to claim 40, Lee teaches all that is required with reference to claim 30, and further teaches a display panel containing said driver control module and said array of sub-pixel elements (see column 5, lines 5-10).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

6. Claims 6, 7, 12, 22, and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee in view of Kumada et al. (US Patent No. 5,563,725).

With reference to claim 6, Lee teaches all that is required with reference to claim 1, but fails to teach a combiner to combine the first and second intermediate sub-pixel data.

Kumada et al. teaches a conversion module comprising:

a first converter (52) to convert the image data representing pixels of said color image in terms of at least three data components into first intermediate sub-pixel data of said four or more colors (see Figure 2 and column 1, lines 49-52);

a second converter (54) to convert the image data representing pixels of said color image in terms of at least three data components into second intermediate sub-pixel data of three or more colors (see Figure 2, and column 1, lines 49-52); and

a combiner (56) to combine said first and second intermediate sub-pixel data into said converted sub-pixel data (see Figure 2 and column 1, lines 52-56),

wherein said controller is able to control at least one of said first and second converters and said combiner based on at least one of said display attributes and image attributes (see column 1, lines 42-56).

It would have been obvious to one of ordinary skill in the art at the time of invention to use two converting circuits to convert the RGB data to four-color data such that each converter is designed to carry out a specific task; in this case, one converter is used to modify the data format, while the other is then able to match the format of the data with the properties which the data would need to possess in order to be properly displayed. This simplifies the construction of the converters and can increase processing speed.

With reference to claim 7, Lee and Kumada et al. teach all that is required with reference to claim 6, and Lee further teaches that said second converter is able to convert the image data representing pixels of said color image in terms of at least three

data components using at least one conversion matrix, which is based on at least one of said display attributes and said image attributes (see column 12, lines 3-50).

With reference to claim 12, Lee teaches all that is required with reference to claim 1, but fails to teach a memory.

Kumada et al. teaches a memory to store display-related data representing said one or more display attributes (see column 6, lines 35-39).

It would have been obvious to one of ordinary skill in the art at the time of invention to store display attributes in a memory such that they can easily and repeatedly be accessed as necessary to convert the incoming data.

With reference to claim 22, Lee teaches all that is required with reference to claim 17, but fails to teach combining the first and second intermediate sub-pixel data.

Kumada et al. teaches that converting said image data comprises:

converting the image data representing pixels of said color image in terms of at least three data components into first intermediate sub-pixel data of said at least four primary colors (see Figure 2 and column 1, lines 46-49);

converting the image data representing pixels of said color image in terms of at least three data components into second intermediate sub-pixel data of at least three primary colors (see Figure 2 and column 1, lines 49-52);

combining said first and second intermediate sub-pixel data into said converted sub-pixel data (see Figure 2 and column 1, lines 52-56); and

controlling at least one of converting said image data into said first intermediate sub-pixel data, converting said image data into said second intermediate sub-pixel data,

and said combining, based on at least one of said display attributes and said image attributes (see column 1, lines 42-56).

It would have been obvious to one of ordinary skill in the art at the time of invention to carry out two conversions to convert the RGB data to four-color data such that each converter is designed to carry out a specific task; in this case, one converter is used to modify the data format, while the other is then able to match the format of the data with the properties which the data would need to possess in order to be properly displayed. This simplifies the construction of the converters and can increase processing speed.

With reference to claim 23, Lee and Kumada et al. teach all that is required with reference to claim 22, and Lee further teaches that converting said image data into said second intermediate sub-pixel data comprises converting said image data using at least one conversion matrix, which is based on at least one of said display attributes and said image attributes (see column 12, lines 3-50).

7. Claims 9 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee in view of Inoue (US Patent No. 5,896,178).

With reference to claim 9, Lee teaches all that is required with reference to claim 5, but fails to teach that said controller is able to determine one or more values of said conversion matrix based on one or more timing signals related to said image data.

Inoue teaches that said controller is able to determine one or more values of said conversion matrix based on one or more timing signals related to said image data (see column 8, lines 21-24).

It would have been obvious to one of ordinary skill in the art at the time of invention to base the conversion factors on the timing of the display signal such that the modified data is still displayed for the intended amount of time. The need for this becomes even further obvious when the display signal is a dynamic video signal.

With reference to claim 25, Lee teaches all that is required with reference to claim 21, but fails to teach determining one or more values of said conversion matrix based on one or more timing signals related to said image data.

Inoue teaches that said controller is able to determine one or more values of said conversion matrix based on one or more timing signals related to said image data (see column 8, lines 21-24).

It would have been obvious to one of ordinary skill in the art at the time of invention to base the conversion factors on the timing of the display signal such that the modified data is still displayed for the intended amount of time. The need for this becomes even further obvious when the display signal is a dynamic video signal.

Response to Arguments

8. Applicant's arguments filed October 21, 2010 have been fully considered but they are not persuasive. Applicant has argued that Lee fails to teach that a second converter converts the sub-pixel data “based on a position of each said sub-pixel element independently.” Examiner respectfully disagrees. The newly cited portion of the Lee reference (column 12, line 50 to column 13, line 26) discusses the optimization of the sub-pixel values carried out by the second converter, in which the voltage level of the white sub-pixel is adjusted relative to the voltage values of the red, green, and blue sub-

pixels. The sub-pixels are arranged so that the different colors have a different positional location relative to each other, and the value of the white sub-pixel must be adjusted so that proper color balance may be achieved. This optimization meets the limitation of converting the data “based on a position.” Further, this limitation is vague and can be interpreted in many ways, not only the specific definition given in the specification. If Applicant wishes to overcome the Lee reference, a more specific description of the conversion based on position should be added to the claim language.

As to Applicant’s argument regarding signal controller 600 as taught by Lee, Examiner respectfully disagrees. Applicant’s argument is based on the figures and description provided in the specification regarding the controller; however, these details have not been incorporated into the claim language, and therefore, all that is required of the reference is to teach the limitation of “a controller to control said conversion module…” which is taught by Lee. Whether control input is “separate and distinct" as argued by Applicant is irrelevant until that limitation is incorporated into the claim language. As cited above, Lee teaches that the controller is “) to control said conversion module to convert said image data into said converted sub-pixel data based on said one more display-attributes and said one or more image-attributes, wherein said controller is able to determine one or more values of said at least one conversion matrix based on at least one display attribute related to said display device and at least one image attribute related to said color image, and to provide said values of said at least one conversion matrix to said second converter.”

As to Applicant's arguments regarding claim 13, Examiner respectfully disagrees. The display attributes as claimed can be one of a configuration of defective sub-pixels, a brightness non-homogeneity, and a color non-homogeneity. Lee teaches that the voltage values for the sub-pixels will be adjusted to ensure that the appropriate luminances will be generated by each sub-pixel, rather than there being a non-uniform overall luminance of the image (i.e. brightness non-homogeneity). With reference to claim 14, the image attributes can be one of perceived bit-depth, viewed smoothness, brightness uniformity, or color uniformity. Again, Lee teaches that the voltage values for the sub-pixels will be adjusted to ensure that the appropriate luminances will be generated by each sub-pixel, rather than there being a non-uniform overall luminance or color of the image (i.e. brightness uniformity or color uniformity). The claim limitations of claims 13 and 14 are vague, and therefore are read on by the Lee reference.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ILANA SPAR whose telephone number is (571)270-7537. The examiner can normally be reached on Monday-Thursday 8:00-4:00 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bipin Shalwala can be reached on (571)272-7681. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Bipin Shalwala/
Supervisory Patent Examiner, Art Unit 2629

ILS